UCRL-JC-124901 Abs

Experimental Measurements of Deformable Mirror Effects on Focal Spot Irradiance Distributions [1]

B.M. Van Wonterghem, E.S. Bliss, J.A. Caird, R.G. Hartley, M.W. Kartz,

J.T. Salmon. P.J. Wegner

University of California

Lawrence Livermore National Laboratory

P.O. Box 800, L-476

Livermore, CA 94550

(510) 423-9494 / FAX (510) 422-7748

[Abstract submitted to 2nd Annual International Conference on Solid-State Lasers for Application to Inertial Confinement Fusion (ICF), Paris, France (1996)]

We examine the performance of a small 39 actuator deformable mirror and its effect on the fundamental and third harmonic focal irradiance distribution of the NIF prototype Beamlet laser. A deformable mirror in the preamplifier beam path corrects the wavefront using a Hartmann wavefront sensor in the output diagnostics of the amplifier chain. It corrects low order optical figure errors and slowly varying thermal effects in heated amplifier slabs using a CW alignment laser. The wavefront aberration induced by the flashlamps in the Nd:Glass amplifier slabs during a shot are corrected by prefiguring the deformable mirror before the shot. Using this system we observed a Strehl ratio of 0.4 in the fundamental beam focus. We discuss the dependence of the detailed focal spot irradiance distribution in a ±30 μrad divergence angle on operating condition of the deformable mirror, and how it is affected by thermal conditions in the amplifier chain.

[1] Work performed under the auspices of the Department of Energy by the Lawrence Livermore National Laboratory under Contract number W-7405-ENG-48